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Letters

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The Importance of Perspective in End-of-Life Care Decisions

The May 2007 article by Day[1] was a unique and thought-provoking view of "conflicts and tragedy" for end-of-life caregivers. I read *The Iliad* many years ago and actually have a copy of it in my library; Day's perspective has piqued my interest and appetite for this type of literature and I think I'll read it again!

The issue of "a fight for dignity" is a curious one. As Day noted, one's dignity is a point of view that depends on which side of the bed we find ourselves. From the family's viewpoint, dignity may be to "continue aggressive treatment to support their loved one's life," whereas the physicians and nurses feel that to continue to poke, prod, and stick the patient, and to put a tube in every orifice available when there really is no hope of a meaningful recovery, is both cruel and undignified.

Quite a few times I've said the very same thing (not in the exact words, of course, but close) that Day writes here: "In the 21st century critical care unit, life-support technology is becoming more and more difficult to reconcile with notions of good and human dignity.…"[1(p292)] Many thanks for an enlightening and thought-provoking article.

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FINANCIAL DISCLOSURES
None reported.

REFERENCE

1. Day L. Lessons from the classics: conflict and tragedy in critical care at the end of life. *Am J Crit Care.* 2007;16(3):290-293.

Accuracy of Glucometers Should Not Be Assumed

Conclusions in the article by Lacara and colleagues[1] contradict recent work soon to be published by our laboratory on the accuracy of bedside glucometer testing in the critical care setting. Our findings demonstrate that hematocrit has a significant effect on the accuracy of widely used point-of-care (POC) glucometers, and we noted that this effect becomes clinically meaningful when red cell volume is less than 34%. Many centers practice permissive anemia[2-4] to reduce exposure to transfused blood, and the higher prevalence of low hematocrits has reduced the accuracy of POC glucose analyzers.[5,6]

The authors discuss the nationally accepted standard error of glucometers of ±20%, but these devices are not intended for intensive care use. Such a degree of inaccuracy is a holdover from a time before tight glucose control became common practice, and should not be accepted by centers that target a glucose level of 80 to 110 mg/dL.[7] Also, error introduced by anemia is not random, but increases with decreasing hematocrit; skewed glucometer results amplify risk of hypoglycemia. Glucometers underestimate the plasma equivalent in anemic whole blood samples, thereby reporting measured values that are too high. This leads clinicians to increase insulin delivery unnecessarily.

In anemic subjects in the intensive care unit (ICU), we noted up to 30% error in glucometer results compared to the laboratory value. A 30% error from 80 mg/dL yields a true value of 56 mg/dL, a clinically significant difference. Moreover, despite manufacturers' claims that glucometers are reliable to a hematocrit range of 20% to 25%, we observed clinically significant errors of greater than 20% when hematocrits dropped below 34%.

A significant flaw of this study is its generalized conclusion regarding the accuracy of the POC glucometer in the authors' ICU without inclusion of an appropriate sample of anemic patients to detect influence of hematocrit. The CRIT study investigators reported that within 48 hours of ICU admission, almost 70% of patients had a baseline hemoglobin level of less than 12 (equivalent to a hematocrit of 36%), and half of those patients had a hemoglobin less than 10 g/dL (hematocrit of 30%).[8] Despite the very narrow range of hematocrit the authors report (mean 31.7%) with a small standard error of the mean (0.8), multiple regression analysis of the data detected a significant hematocrit effect.

We are concerned that Lacara and colleagues invite readers to accept that POC glucose monitors reliably approximate laboratory glucose values. However, it is incumbent on users of POC devices, in both critical and subacute care settings, to determine the prevalence of anemia in their own populations and evaluate glucometer performance in this cohort. The authors do make this recommendation in their article, but a hematocrit of less than 34%—not typically

considered "abnormal"—was the level at which we found clinically significant error.

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FINANCIAL DISCLOSURES
None reported.

OTHER DISCLOSURES
The views expressed in this letter are those of the authors and do not reflect the official policy of the Department of the Army, the Department of Defense, or the US Government.

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1. Lacara T, Domagtoy C, Lickliter D, et al. Comparison of point-of-care and laboratory glucose analysis in critically ill patients. *Am J Crit Care.* 2007;16(4):336-347.
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Response:

Like other studies, ours found that hematocrit was a significant contributor to the differences observed between arterial POC and laboratory glucose determinations, and we referenced this fact in numerous places in the article.[1(pp336,338,341,344,345)] Significant space in the Discussion section of the paper also was devoted to this finding, and we mentioned other, similar study results and hypotheses raised by previous investigators about why abnormally low and high hematocrit values affect the accuracy of the POC glucose meter.[1(pp341-344)]

We disagree that our discussion of the results "invite[s] readers to accept that POC glucose monitors reliably approximate laboratory glucose values." We could not have been clearer when we directed readers to exercise "caution in using any individual POC glucose value as a basis for adjusting insulin doses when tight glucose management protocols are being used."[1(p345)] We also explained that "[m]any of the patients in our study had glucose differences of at least 10 mg/dL between the POC and laboratory methods, which may be a large enough difference for the true glucose value to change management decisions when treatment protocols call for narrow ranges for glucose levels."[1(p339)]

Another direction we provided to readers, based on study findings, was that the POC glucose value obtained with catheter blood is similar to that obtained from a fingerstick source. That result validates the common practice in critical care units of substituting catheter blood for fingerstick blood when performing frequent POC testing. This statement pertains to sources of blood for POC testing and was not an endorsement of POC testing as a substitute for laboratory analysis of glucose.

Again, as we stated, clinicians should use caution in interpreting POC results because large discrepancies between POC and laboratory values were found in individual subjects in our study.

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FINANCIAL DISCLOSURES
None reported.

REFERENCE
1. Lacara T, Domagtoy C, Lickliter D, et al. Comparison of point-of-care and laboratory glucose analysis in critically ill patients. *Am J Crit Care.* 2007;16(4):336-347.

Article Spreads the Word About VAP Prevention

With respect to the article by Labeau et al,[1] we believe that development of a questionnaire to accurately evaluate nurses' knowledge of current ventilator-associated pneumonia (VAP) guidelines is an admirable pursuit. Appreciating the knowledge gap in this area is crucial as healthcare and medicine continue to advance. The incidence of VAP and related morbidity and mortality can be reduced by preventive measures such as those mentioned in the article (eg, semirecumbent positioning, circuit changes).

In our coronary care unit at a tertiary hospital in upstate New York, we implemented a similar plan, monitoring nursing compliance with strategies for reducing the prevalence of VAP. Only through chart reviews and interviewing staff members did we discover that unassisted ventilator trials (UVTs) were not routinely being performed for patients who needed them; in fact, only 70% of ventilated patients who qualified were receiving this recognized

preventive measure. When we realized that 30% of our patients were not receiving UVTs, we reviewed and updated our ventilator protocol to meet the needs of this patient population.

As compliance with the overall protocol has increased, we have continued to maintain a 0% incidence of VAP. Cardiac exclusion criteria also have been added to our protocols, resulting in no UVTs being necessary for our intra-aortic balloon pump patients. This key evidence-based bundle ought to include a multidisciplinary approach beginning with nurses; subsequent education for respiratory and medical staff might help to increase compliance.

We appreciate the article by Labeau and colleagues, which helped us to expand our own understanding of VAP and VAP prevention.

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FINANCIAL DISCLOSURES
None reported.

REFERENCE

1. Labeau S, Vandijck DM, Claes B, Van Aken P, Blot SI. Critical care nurses' knowledge of evidence-based guidelines for preventing ventilator-associated pneumonia: an evaluation questionnaire. *Am J Crit Care.* 2007;16(4):371-377.